

AMENDMENTS TO THE CLAIMS:

This listing of claims replaces all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (Currently Amended) A fuel cell system comprising:

a fuel cell comprising an anode, a cathode, and an ion exchange membrane between the anode and the cathode;

a fuel delivery conduit comprising:

a fluid flow field plate forming part of the anode, having a fluid flow channel extending through the fluid flow plate;

a fuel delivery inlet coupled to one end of the fluid flow channel;

a fuel delivery outlet coupled another end of the fluid flow channel; and

a fluid flow regulator for controllably varying a quantity of fuel delivered to a mixing point ~~in~~ adjacent to the fuel delivery inlet; and

a recirculation conduit extending between the fuel delivery outlet and the mixing point, wherein the mixing point is external to the fuel cell and comprises either (i) a reaction chamber for reacting fuel, or (ii) a pre-mixing chamber, the mixing point for mixing fuel from the fluid flow regulator with oxidant species from the recirculation conduit.

2 to 4. (Canceled)

5. (Currently Amended) A fuel cell system according to claim 1 [[4]], wherein the reaction chamber includes a catalyst material.

6. (Canceled)

7. (Currently Amended) A fuel cell system according to claim 1 [[3]], wherein the recirculation conduit is switchably connected to the fuel delivery outlet via a two way valve.

8 and 9. (Canceled)

10. (Previously Presented) A fuel cell system according to claim 1, further comprising:
control means for switching the fuel cell between a normal mode of operation in which a relatively high flow rate of fuel is delivered to the anode and oxidant is delivered to the cathode, and a recirculation mode in which a relatively low flow rate of fuel is delivered to the anode together with oxidant delivered via the recirculation conduit.

11. (Previously Presented) A fuel cell system according to claim 1, further comprising:
control means for switching the fuel cell between a normal mode of operation in which a relatively high flow rate of fuel is delivered to the anode and oxidant is delivered to the cathode, and a recirculation mode in which a relatively low flow rate of fuel is delivered into the fuel delivery conduit together with oxidant delivered via the recirculation conduit.

12. (Previously Presented) A fuel cell system according to claim 1, further comprising:
an oxidant supply conduit extending from an oxidant supply to the mixing point.

13. (Previously Presented) A fuel cell system according to claim 12, further comprising:
an oxidant flow regulator for controllably varying a quantity of oxidant delivered to the
mixing point.

14. (Previously Presented) A fuel cell system according to claim 13, wherein the oxidant
flow regulator comprises a valve coupling the oxidant supply conduit to a cathode oxidant
delivery conduit.

15. (Currently Amended) A fuel cell system according to claim 12, wherein the mixing
point is comprises a reaction chamber for reacting fuel from said fluid flow regulator with
oxidant species from said oxidant supply conduit.

16. (Previously Presented) A fuel cell system according to claim 15, wherein the
reaction chamber includes a catalyst material.

17. (Previously Presented) A fuel cell system according to claim 1, further comprising:
means for effecting a controlled combustion of fuel and oxidant species within a cathode
fluid delivery conduit.

18. (Previously Presented) A fuel cell system according to claim 17, wherein the
cathode fluid delivery conduit comprises:

a fluid flow field plate forming part of the cathode, the fluid flow field plate comprising a
fluid flow channel extending through the fluid flow field plate;

an oxidant delivery inlet coupled to one end of the cathode fluid flow conduit; and

an exhaust outlet coupled to another end of the cathode fluid flow conduit.

19. (Previously Presented) A fuel cell system according to claim 18, wherein the means
for effecting a controlled combustion within a cathode comprises a fuel supply conduit extending
from a fuel supply to a mixing point in the oxidant delivery inlet.

20. (Previously Presented) A fuel cell system according to claim 19, wherein the mixing
point comprises a reaction chamber for reacting fuel from the fuel supply conduit with oxidant
species from said oxidant supply.

21. (Canceled)

22. (Previously Presented) A fuel cell system according to claim 26, further comprising:

a fluid flow regulator for controllably varying the quantity of fuel delivered to the mixing point.

23. (Previously Presented) A fuel cell system according to claim 22, wherein the mixing point comprises a reaction chamber for reacting fuel from the fluid flow regulator with oxidant species from the recirculation conduit.

24. (Previously Presented) A fuel cell system according to claim 22, wherein the mixing point comprises a pre-mixing chamber for mixing fuel from the fluid flow regulator with oxidant species from the recirculation conduit.

25. (Previously Presented) A fuel cell system according to claim 26, wherein the recirculation conduit is switchably connected to the fuel delivery outlet via a two way valve.

26. (Currently Amended) A fuel cell system comprising:
a fuel cell comprising an anode, a cathode, and an ion exchange membrane between the anode and the cathode;

a fuel delivery conduit comprising:

a fluid flow field plate forming part of the anode, the fluid flow plate comprising a fluid flow channel extending through the fluid flow plate;

a fuel delivery inlet coupled to one end of the fluid flow channel; and

a fuel delivery outlet coupled another end of the fluid flow channel;

a recirculation conduit extending between the fuel delivery outlet and a mixing point adjacent to ~~in~~ the fuel delivery inlet; and

detection means for detecting a level of oxidant species present in at least part of the fuel delivery conduit;

wherein the mixing point is external to the fuel cell and comprises either (i) a reaction chamber for reacting fuel, or (ii) a pre-mixing chamber, the mixing point for mixing fuel from the fluid flow regulator with oxidant species from the recirculation conduit.

27. (Previously Presented) A fuel cell according to claim 26, wherein the detection means comprises means for testing an open circuit voltage across the anode and cathode of the fuel cell.

28. (Previously Presented) A fuel cell system according to claim 26, further comprising:
control means for switching the fuel cell system between a normal mode of operation in which a relatively high flow rate of fuel is delivered to the anode and oxidant is delivered to the cathode, and a recirculation mode in which a relatively low flow rate of fuel is delivered to the anode together with oxidant delivered via the recirculation conduit.

29. (Previously Presented) A fuel cell system according to claim 26, further comprising:

control means for switching the fuel cell system between a normal mode of operation in which a relatively high flow rate of fuel is delivered to the anode and oxidant is delivered to the cathode, and a recirculation mode in which a relatively low flow rate of fuel is delivered into the fuel delivery conduit together with oxidant delivered via the recirculation conduit.

30. (Currently Amended) A fuel cell system comprising:

a fuel cell having an anode, a cathode, and an ion exchange membrane between the anode and the cathode;

a fuel delivery conduit for delivering preconditioned fuel to the anode, comprising:

- a reaction chamber for reacting fuel and oxidant;
- a fuel supply inlet for delivering fuel to the reaction chamber;
- an oxidant supply inlet for supplying oxidant to the reaction chamber; and
- a reaction chamber outlet connected to the anode;

wherein the reaction chamber is external to the fuel cell and is adapted so that at least a part of the fuel supply delivered to the reaction chamber is reacted with the oxidant supplied to the reaction chamber to precondition the fuel being delivered to the anode;

wherein the fuel delivery conduit further comprises a recirculation conduit to supply oxidant from an output of the fuel cell to the reaction chamber; and

wherein the reaction chamber is configured to mix fuel from the fuel supply inlet with oxidant species from the recirculation conduit.

31. (Previously Presented) A fuel cell system according to claim 30, further comprising:
control means for controllably varying a flow rate of one or both of the fuel and oxidant from the oxidant supply inlet in order to achieve a predetermined degree of humidification of a fuel stream delivered to the anode.

32. (Previously Presented) A fuel cell system according to claim 30 further comprising:
control means for controllably varying the flow rate of one or both of the fuel and oxidant from the oxidant supply inlet in order to achieve a predetermined degree of pre-heat of a fuel stream delivered to the anode.

33 to 36. (Canceled)

37. (Currently Amended) A method of operating a fuel cell ~~system having~~ comprising an anode, a cathode, and an ion exchange membrane between the anode and the cathode, the method, comprising:
supplying fuel from a fuel source to an active surface area of the anode via a fuel delivery conduit;
recirculating fluid within the fluid delivery conduit to a mixing point upstream of the active surface area of the anode; and
effecting a controlled combustion of fuel and oxidant species ~~within the fuel delivery conduit~~ at the mixing point and external to the fuel cell.

38. (Canceled)

39. (Previously Presented) The method of claim 37, further comprising:
consuming oxidant species at the mixing point, in a reaction chamber.

40. (Previously Presented) The method of claim 37, further comprising:
controllably varying a quantity of fuel delivered to the mixing point.

41 to 50. (Canceled)